

ANNUAL REPORT
THE IMPERIAL BACTERIOLOGIST
FOR THE YEAR 1913-14

Muktesar Laboratories

CALCUTTA
INTENDENT GOVERNMENT PRINTING, INDIA
1914

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Annual Report of the Imperial Bacteriologist

For the year 1913-14

I.—ADMINISTRATION.

I held charge of the Laboratory throughout the year. Mr. Meadows acted as the Assistant Bacteriologist up to the 5th March 1914, when he was transferred to the North Punjab. Mr. Shilston, the new Assistant Bacteriologist appointed by the Secretary of State for India, reported his arrival in Bombay on the 20th March 1914.

2. The post of Physiological Chemist, vacated by Dr. Hartley in February 1913, and the new post of Pathologist on the staff of the Laboratory sanctioned by the Secretary of State in July 1913 remained unfilled during the year under report, but since the close of the year candidates for these posts have been selected and are expected to arrive shortly.

3. Mr. Kriebel, Head Laboratory Assistant, returned from leave on the 30th June 1913, and Mr. Keiller, the second European Laboratory Assistant, availed himself of 15

months' combined leave with effect from the 9th June 1913. Messrs. Goffi, the third European Laboratory Assistant, and Mobbs, an Assistant engaged temporarily, remained on duty throughout the year.

4. The Farm Manager's appointment was vacant up to the beginning of June 1913. On the 9th June, Lieutenant W. J. N. Cheatle took over charge of the duties on 2 years' probation.

5. After serving for 5 months Mr. Proctor, the Electrician, resigned, and Mr. Berkley was appointed with effect from 1st May 1913 on probation.

6. The Veterinary staff of the Laboratory was increased by the appointment of an additional Veterinary Inspector. Mr. D'Monte was raised to the grade of Deputy Superintendent.

7. *Fodder Supply*.—The arrangements for the supply of grass and grain were the same as in previous years.

8. *Forests*.—The demand for fuel was greater than the supply from the Laboratory reserved forest. Arrangements were made with the Forest Department to supply 10,000 maunds of fuel from the surrounding District Forests.

The administration of the Muktesar reserved forest was continued. A Forester trained in the Forest Department has been appointed on Rs. 15 per mensem to supervise its working under the forest rules.

The Nursery was maintained and planting of *deodar* seedlings was carried on as usual.

9. *Water Supply*.—During the latter part of the year the supply of water gradually diminished in the spring. This caused inconvenience, and the question is still in the hands of the Public Works Department for a detailed report. It appears that the spring can only give about 4,500 gallons of water within 24 hours, whereas our minimum requirement is about six to seven thousand gallons per day.

10. *Electric Centrifuges*.—In connection with the Electric installation eleven centrifuges specially designed by Messrs. Baird and Tatlock of London were received at Kathgodam in October and transported to Muktesar during December 1912, where they lay waiting for erection which did not commence before 24th April 1913. It was found that the spindles of the centrifuges had been bent in transit and consequently they were unsafe to run. New spindles were made in Calcutta, and several of the centrifuges were erected in October 1913. After a short trial of these machines they were found unsafe to run and, in February 1914, at the instance of the Government of India, a Committee was held at Muktesar to investigate the cause of their failure. This Committee, after a careful examination of the centrifuges, concluded that the failure was entirely due to their faulty design and that it was in no way connected with the foundation or method of erection employed.

It was subsequently decided that, as it is impossible to make any alteration to the existing plant to render it thoroughly reliable and satisfactory, the best possible machine on the market be obtained through the Director General of Stores, London, under a guarantee from the firm by which it is supplied. Serum preparation had to be carried on by the clotting method and by the aid of the old centrifuges, but since the close of the year under report it has been found possible to work some of the new centrifuges at half speed by inserting indiarubber buffers underneath the bed plates.

11. *Supply of Hill Bulls*.—The arrangements for the supply of Hill bulls and plains animals were the same as in previous years.

12. *Bareilly Branch Laboratory*.—This Laboratory remained open during the winter season. The usual work of serum testing, training Veterinary Assistants, and Military Dairy Farm Managers and research on Kumri and other diseases was carried out.

The work in connection with the removal of the Laboratory to its new site is progressing favourably. The land has been acquired and a special officer of the Public Works Department is in charge of the new buildings.

Plans and estimates for these are in the course of preparation.

When the branch Laboratory is completed, it is hoped that the increasing demand for rinderpest serum will be easily supplied. Government has sanctioned an additional staff of dressers, packers and other menials to carry on the serum preparation work at Bareilly during the winter months.

II.—PREPARATION OF SERUMS AND VACCINES.

13. *Rinderpest Anti-Serum*.—During the year 1913-14, 7,20,870 doses of Anti-Rinderpest serum were prepared against 8,05,500 doses during the year 1912-13, and 7,48,470 doses issued against 11,28,500 during the previous year.

This decrease in the output and issue was due to the unexpected breakdown of our centrifuges. There was a large demand for the serum which could not be complied with in full.

The balance of the demand of the Egyptian Government of about 8 $\frac{3}{4}$ lacs doses had to be suspended and no agreement could be made with the Government of Rhodesia for the supply of 5 lacs of doses at 5 c. c.

The net amount realized from the sale of this serum up to 31st March 1914 amounted to Rs. 1,08,994,* and by adding to it the cost of 91,918 doses supplied free to the Military Department the total income from this source alone would come to Rs. 1,20,483.

* Most of the bills are still awaiting payment and have to be carried over to the next year's account.

14. The following figures, as collated from the respective returns received, show the results of Anti-Rinderpest serum injections carried out in the field:—

Province.	Number of outbreaks in which inoculation was undertaken.	NUMBER OF ANIMALS WHICH DIED UNINOCULATED IN COURSE OF DISEASE.			NUMBER OF ANIMALS INOCULATED.			NUMBER OF ANIMALS WHICH DIED AFTER INOCULATION.			REMARKS.
		Equines.	Bovines.	Others.	Equines.	Bovines.	Others.	Equines.	Bovines.	Others.	
North-West Frontier Province and North Punjab	80	...	170	...	...	6,409	...	...	2	...	
Sind, Baluchistan and Rajputana	7	...	0	193	...	103	1,074	...	1	2	
Central Provinces	Nil.	...	10,498	...	...	94,080	...	...	256	...	
United Provinces	468	...	4,654	...	...	54,185	204	...	19	...	
Burma	14	...	410	...	...	6,745	...	...	41	...	
Punjab	191	...	2,805	...	...	29,576	...	...	85	...	
Bombay	76	...	892	5	...	12,526	81	...	50	...	
Assam	198	...	4,357	238	...	19,958	1,027	...	805	10	
Madras	270	...	2,322	304	...	34,047	100	...	15	...	
Bengal	166	...	3,214	...	...	23,836	...	...	159	...	
Bihar and Orissa	209	...	2,659	...	...	28,442	...	...	114	...	
Bengal Veterinary College	56	...	87	...	...	1,911	...	...	32	...	
TOTAL	1,085	...	88,074	735	...	319,433	2,436	...	1,029	12	

During July and August 1913, a severe outbreak of rinderpest occurred in the villages of Mauna, Gairari and Bairoli, some 8 to 10 miles distance from the Laboratory.

At the request of the villagers some 348 head of cattle were inoculated. The headmen of the villages at a later date reported that the disease was stamped out immediately and no casualty occurred among the inoculated animals.

The following extract from the Report by the Chief Veterinary Officer to the Egyptian Government on cattle plague and double inoculation is interesting, as during 1913 they used about $1\frac{1}{2}$ lac doses of serum prepared at this Laboratory.

"From the 16th October until 31st December 1913, 21,849 cattle were injected with virulent blood and serum. The mortality was 566 or 2.59 per cent."

"Of the above number 3,987 cattle were inoculated on nine different dates with 262 deaths or 6.57 per cent. due largely to Piroplasmosis (Texas and Egyptian fevers) following double inoculation. 17,862 cattle were inoculated on other dates with 304 deaths or 1.7 per cent."

"In addition to Texas fever causing losses, the cold weather and the absolute negligence of the owners of cattle have largely assisted."

"The total number of cattle immunised since the double inoculation commenced up to 31st December 1913 is 167,007 in the cotton districts and 18,020 in the non-cotton districts, making a total of 185,027."

"In addition 763 cattle were inoculated, but the final results have not yet been received."

"The total number of deaths up to 31st December 1913, including outbreaks, is 1,989, showing a percentage of 1.07."

"The number of non-inoculated cattle reported as having died from natural infection of cattle plague during the year 1913 was 1,824 which, added to 1,916 deaths following double inoculation during the same year, makes a total of 3,740 against 5,445 deaths from cattle plague during the year 1912."

"On the 16th December 1913, a further 100 cattle of the State Domains, doubly inoculated on 27th June 1912, of which 39 reacted, were injected with virulent blood, and kept under observation for 15 days. No cases of cattle plague followed nor any cattle plague reaction. It is

therefore assumed that double inoculation has conferred immunity for a period of not less than 18½ months."

"From a long experience I came to the conclusion that serum could not be considered an efficient means for stamping out cattle plague; it acted frequently as a temporary check and prevented for the time being the disease extending; serumised cattle were allowed to continue their work, which is of the greatest importance at certain seasons of the year."

"Further a large number of cattle having had serum are attacked by cattle plague in a mild form, recover and are hence immunised, a very important factor in dealing with the disease and which has assisted in immunising during recent years, a large number of cattle."

15. *Anthrax Anti-Serum*.—During the year under report 3,920 doses were manufactured against 2,658 during the previous year, and 20,097 doses issued against 6,718 during the year 1912-13.

The demand for this serum increased and was complied with from the stock in hand prepared towards the end of the previous year.

16. The results obtained in the field from inoculations with *Anthrax* serum are as follows:—

Province.	Number of outbreaks in which inoculation was undertaken.	NUMBER OF ANIMALS WHICH DIED UNINOCULATED IN COURSE OF DISEASE.			NUMBER OF ANIMALS INOCULATED.			NUMBER OF ANIMALS WHICH DIED AFTER INOCULATION.			REMARKS.
		Equines.	Bovines.	Others.	Equines.	Bovines.	Others.	Equines.	Bovines.	Others.	
Assam	20	16	68	...	450	2,054	53	3	3	...	
Bihar and Orissa	11	...	19	...	...	1,263	...	...	...	...
Mysore	...	...	...	...	...	329	...	...	...	...
TOTAL	31	16	85	...	400	4,246	53	3	3	...	

17. *Hæmorrhagic Septicæmia*.—During the past year 57,829 doses of this serum were prepared and 63,980 issued against 40,901 prepared and 43,218 issued during the year 1912-13.

In addition to this, 2,42,320 doses of *Hæmorrhagic Septicæmia Vaccine* were manufactured and issued against 25,750 during the previous year. There was a great demand for this product during the rainy season.

18. The subjoined table will show the results of *Hæmorrhagic Septicæmia* serum and Vaccine injections carried out in the field.

Province.	Number of outbreaks in which inoculation was undertaken.	NUMBER OF ANIMALS WHICH DIED UNINOCULATED IN COURSE OF DISEASE.			NUMBER OF ANIMALS INOCULATED.			NUMBER OF ANIMALS WHICH DIED AFTER INOCULATION.			REMARKS.
		Equines.	Bovines.	Others.	Equines.	Bovines.	Others.	Equines.	Bovines.	Others.	
United Provinces	84	...	436	..	...	9,504	...	...	...	...
Punjab	116	...	1,025	...	...	20,477	...	...	13	...	
North-West Frontier Province and North Punjab.	37	...	...	...	...	3,036	...	...	...	...
Assam	18	...	263	31	...	2,139	...	...	58	2	
Madras	12	...	118	...	...	3,495	...	...	1	...	
Sind, Baluchistan and Rajputana.	4	...	37	...	...	856	...	...	...	...
Bengal	42	...	463	...	...	5,567	...	...	6	...	
Bihar and Orissa	151	...	842	...	...	18,716	...	...	33	...	
TOTAL	464	...	3,184	31	...	63,790	...	...	111	2	

The Superintendent, Civil Veterinary Department, Central Provinces, in his letter No. 2717-20, dated 6th October 1913, states: "*Hæmorrhagic Septicæmia* occurred at a village 1 mile from the Government Farm, Hoshangabad ;

140 animals were inoculated at the villages and 127 on the Farm. The result was excellent, there being no deaths after the serum inoculation, and both outbreaks subsided at once. The information may interest you, as the serum has not been used in these provinces before."

19. *Charbon Symptomatique Vaccine*.—Out of the last year's stock of 47,350 doses of this vaccine, 22,760 were issued during the year under report as against 10,800 doses issued during the previous year.

20. The results of injections carried out in the field with *Charbon Symptomatique Vaccine* are given in the following table :—

Province.	Number of outbreaks in which inoculation was undertaken.	NUMBER OF ANIMALS WHICH DIED UNINOCULATED IN COURSE OF DISEASE.			NUMBER OF ANIMALS INOCULATED.			NUMBER OF ANIMALS WHICH DIED AFTER INOCULATION.			REMARKS.
		Equines.	Bovines.	Others.	Equines.	Bovines.	Others.	Equines.	Bovines.	Others.	
United Provinces	20	...	108	...	...	1,581	...	...	...	...
Punjab	11	...	...	...	...	1,391	...	...	...	...
North Punjab	30	...	...	...	...	3,528	...	...	...	...
Madras	8	...	12	...	...	115	...	...	...	...
Bihar and Orissa	18	...	76	...	...	4,180	...	...	9	...	
Mysore State	...	...	...	...	...	1,891	...	...	...	...
TOTAL	82	...	196	...	...	12,689	...	...	9	...	

21. *Mallein*.—17,406 doses of Mallein were prepared and 16,275 issued during the year under report, against 15,181 doses manufactured and 17,933 issued during the year 1912-13.

22. *Tuberculin*.—During 1913-14, 910 doses of Tuberculin were prepared against 530 during the previous year and 522 issued against 162 in the year 1912-13.

23. *Strangles Serum*.—13,577 doses of Strangles serum were manufactured and 12,192 issued during the year under report, against 2,470 prepared and 2,320 issued during the preceding year. Almost all the serum was issued to the Remount Depôts. The Veterinary Officers employed it chiefly as a curative agent and report good results following its use.

The Veterinary Officer, Sargodha Remount Depôt, in a demi-official letter, dated 25th April 1914, reports the following :—

“It has given splendid results as a curative agent despite the large mortality. Without the serum the mortality would easily have been doubled.”

24. *Specimens examined*.—During the past year 97 specimens of different diseases were received at the Laboratory for examination and report.

25. *Training of Veterinary Assistants and Dairy Farm Managers*.—Nine Veterinary Assistants (2 at Muktesar and 7 at Bareilly) and three Dairy Managers (1 at Muktesar and 2 at Bareilly) of the Military Department, received training in the methods of inoculation with serum alone during the year 1913-14.

Captain A. N. M. Swanston, A.V.C., Cavalry School, Saugor, Central Provinces, underwent a course of Microscopy at Muktesar for a short period during June 1913.

III.—RESEARCH WORK.

26. *Research*.—The programme of Research work for the year 1913-1914 was as follows :—

- (1) *Rinderpest*.—Further experiments regarding methods of treatment and prophylaxis.
- (2) *Surra*.—To continue experiments in methods of treatment and investigation regarding transmission.

(3) *Anthrax*.—To continue investigations of methods of immunizing against this disease.

(4) *Kumri*.—To continue the study of the etiology and pathology of Kumri.

(5) *Bursati*.—An investigation of the etiology of Bursati.

27. During the past year the post of Physiological Chemist was vacant. The post of Assistant Bacteriologist was held by an officer who had no training or experience of Research work. Consequently I had to undertake the whole of the investigation work in addition to the administration and to many other duties.

28. *Rinderpest*.—An interesting enquiry was carried out regarding the influence of various drugs on the course of Rinderpest and their action as prophylactics.

The results of this investigation have been submitted for publication in Memoir form.

Some experiments were made on the effect of heat on the Rinderpest Immune bodies, and a paper on the subject was forwarded for publication.

29. *Surra*.—Further experiments on the treatment and transmission of Surra were carried out.

30. *Anthrax*.—An investigation was made on the immunizing effect of the simultaneous injection of Anthrax attenuated virus and an Anthrax anti-serum; a paper on this subject has recently been submitted for publication.

Some tests were made on the M'Fadyean staining reaction for Anthrax bacilli, and the results published in bulletin form.

31. *Hæmorrhagic Septicæmia*.—Experiments were made on the drug treatment of Hæmorrhagic Septicæmia on cattle and the results submitted for publication.

The investigation on the vitality of the Hæmorrhagic Septicæmia organism outside the body was concluded and a paper on the subject has been published.

32. *Kumri*.—The investigation on the etiology of Kumri was continued, but no definite results have been arrived at.

33. *Bursati*.—The investigation on the etiology and treatment of Bursati was continued and the results submitted for publication.

34. *Publications*.—The following articles from the Laboratory were submitted for publication during the year and appeared in a Veterinary series of Bulletins and Memoirs of the Department of Agriculture :—

- (1) A Note on the M'Fadyean staining reaction for Anthrax Bacilli (in the form of Bulletin) by J. D. E. Holmes.
- (2) Some cases of Surra treated in the field and in the Laboratory during the Autumn of 1911 (Memoir) by J. D. E. Holmes.
- (3) Further investigations on questions connected with the Economical Productions of Anti-serum (Rinderpest) (Memoir) by J. D. E. Holmes.
- (4) The vitality of the Hæmorrhagic Septicæmia organism outside the body (Memoir) by J. D. E. Holmes.
- (5) The Curative Treatment of Hæmorrhagic Septicæmia in cattle by the administration of Iodine and other Notes on Chemiotherapy in Rinderpest and Hæmorrhagic Septicæmia (Memoir) by J. D. E. Holmes.
- (6) Memoir on "Bursati" by J. D. E. Holmes.
- (7) A Note on the effect of heat on the Rinderpest immune bodies (Bulletin) by J. D. E. Holmes.

35. *General Remarks*.—The breakdown of the centrifuges in June 1914 was a serious handicap to the serum preparation work. The serum preparation was continued by means of the clotting method which entails a considerable

increase of labour and expense. Every endeavour was made to meet the demands for serum. The amount of anti-Rinderpest serum manufactured during the year fell short of that of the previous year by less than one lac of doses.

The demand for this serum was very large and could not be complied with in full. The order for Rinderpest serum from Egypt and the Soudan and the enquiry for serum from Rhodesia had to be rejected.

If the centrifuges had not broken down the manufacture of serum would have been almost double the amount prepared by the clotting method.

The amount of Anthrax, Hæmorrhagic Septicæmia and Strangles serum prepared and issued during the year was in excess of previous years.

The amount of Hæmorrhagic Septicæmia vaccine prepared and issued was much in excess of any previous year.

The fact that the post of Physiological Chemist was vacant and the post of Assistant Bacteriologist held by an officer untrained in scientific work increased the work and responsibility of myself and the European Laboratory Assistants.

The serum preparation of the Laboratory was heavier than usual owing to the difficulties of clotting large amounts of blood. A considerable amount of useful research work was carried out, and several articles from the Laboratory were submitted for publication during this year.

I wish to record my thanks to the staff for their zeal and co-operation in all the work of the Laboratory.

J. D. E. HOLMES, Major,
Imperial Bacteriologist.

Table showing the doses of different products issued from the

Name of sera.	QUANTITY							
	Punjab.	North-West Frontier Province.	South Punjab.	United Provinces.	Bengal.	Assam.	Bihar and Orissa.	Central Provinces.
Rinderpest serum .	21,050	23,000	20,130	128,450	35,300	48,000	61,800	131,000
Anthrax serum .	...	...	...	...	...	5,000	3,700	...
Hæmorrhagic Septicæmia serum.	14,052	...	15,000	6,000	5,000	4,000	8,000	3,300
Hæmorrhagic Septicæmia Vaccine.	20	3,850	2,450	8,100	...	...	226,400	1,000
Charbon Symptomatique Vaccine.	10	4,800	1,500	5,000	...	...	8,000	...
Mallein . . .	116	36	...	...	50	...	...	..
Tuberculin . .	103	...	...	...	50	...	100	...
Anti-Streptococcic serum.	20	...	...	..	...	...	...	...
TOTAL .	38,371	31,686	39,080	147,550	44,400	57,000	307,800	135,300

Muktesar Laboratory, during the year 1913-14.

ISSUED IN DOSES.

Bombay.	Madras.	Sind, Baluchistan and Rajputana.	Burma.	Military Department.	Native States.	Indian Firms.	Foreign Countries.	Imperial Bacterio- logical Laboratory.	TOTAL.
11,070	8,000	5,000	15,000	85,662	7,066	200	133,770	11,172	748,470
...	...	...	...	133	6,020	...	...	5,244	20,097
...	3,000	266	...	100	...	...	...	1,262	63,980
...	...	500	...	...	...	...	...	...	242,320
100	...	50	...	1,300	2,000	...	...	...	22,760
50	...	170	100	14,347	235	...	...	1,171	16,275
...	...	5	...	216	12	...	...	86	522
...	...	...	...	12,059	100	...	...	13	12,192
11,220	11,000	5,991	15,100	113,817	15,433	200	133,770	18,898	1,126,616

REPORT OF THE IMPERIAL BACTERIOLOGIST

Table showing main results of the working of the Imperial

QUANTITY OF SERA OR ANTI-TOXIN DOSES PREPARED AND ISSUED.								INSTRUCTIONS IMPARTED.				
	Name of sera or anti-toxin.	Opening balance.	Prepared during the year.	Returned serum re-issued.	Total.	Issued during the year.	Stock in hand.	Department or Province.	Veterinary Assistants or Inspectors attending class.	Number passed.	Sale of animals.	
1	2	3	4	5	6	7	8	9	10	11	12	
Muktesar Laboratory.	Rinderpest . .	A 84,160	720,870	6,700	811,720	748,470	63,250	Native States		2	2	973
	Anthrax . .	B 18,677	3,020	...	22,497	20,097	2,400					
	Hæmorrhagic Sep- ticæmia Serum.	0,161	57,829	...	63,080	63,080	...					
	Hæmorrhagic Sep- ticæmia Vaccine.	...	242,320	...	242,320	242,320	...					
	Charbon Sympto- matique Vaccine.	47,350	...	...	47,350	22,700	24,650			
	Mallein . .	1,472	17,400	...	18,678	10,275	2,603					
	Tuberculin . .	492	910	...	1,392	523	870					
	Anti-Streptococcal Serum.	175	13,577	...	13,752	12,102	1,580					
Bareilly Depôt.	Barsati Serum .	400 c. c.	400 c. c.	...	400 c. c.	Bombay Presi- dency.		7	7	87
	TOTAL .	1,63,867 + 2300 c. c.	1,056,832	6,700	1,221,880 + 490 c. c.	1,123,619	95,273 + 490 c. c.					

A. The difference between the figures in column 8 of the last year's statement and those in column 8 of this statement is as well as in column 5. The present figures in column 8 of this statement show the actual amount in hand after deducting

B. The difference between the figures in column 8 of the previous year's statement and those in column 8 of this statement proved, on being tested during the year under report to be only 2,600 doses, i.e., 68 doses less.

* This includes amount received up to 31st March 1914 for serum issued during the year 1913-14.

Bacteriological Laboratory during the year 1913-14.

FINANCIAL RESULTS.									
Receipts.				Expenditure.					
Sale of sera.	Sale of garden products and Reserve Forest.	Other miscellaneous receipts.	Total.	Salaries and Travelling allowances of officers and establishment.	Feed and keep of animals.	Cost of chemicals and apparatus.	Other miscellaneous expenditure.	Purchase of animals.	TOTAL.
13	14	15	16	17	18	19	20	21	22
1,02,904 11 8	800 0 0	1,740 0 0	1,11,641 4 8	63,841 13 7	62,600 0 1	7,476 7 0	27,101 13 0	13,070 8 0	1,80,208 10 1
...	107 0 0	...	107 0 0	14,607 3 0	5,169 4 4	...	...	8,800 0 0	22,996 8 1
1,02,904 11 8	1,007 0 0	1,740 0 0	1,11,749 4 8	83,240 1 4	67,008 4 5	7,476 7 0	27,101 13 0	17,379 8 0	2,03,205 3 6

is due to 8,600 doses of returned serum having erroneously been shown twice in the last year's statement, i.e., in column that excess.

is due to an amount of antised serum approximating to 2,000 doses included in column 4 of the last year's statement having

Cost of serum supplied to the Military Department shown separately in the body of the report

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